

FACULTY OF DENTISTRY LIBRARY
UNIVERSITY OF TORONTO



3 1761 03914527 1

BOX, HAROLD KEITH.

PERIODONTAL STUDIES. 7,8,9.

834

RK
361
B693
No.7-9

Box, Harold Keith.

Periodontal studies. 7, 8, 9.

834

D64
B788
H.R.A.



AEW 5455

PERIODONTAL STUDIES

Nos. 7, 8 and 9

by

HAROLD KEITH BOX, D.D.S., Ph.D.,

Research Professor of Periodontology,
Faculty of Dentistry,
University of Toronto

834
22:4:40

The University of Toronto Press
1940

KK
361
B693
no. 7-9

THE UNIVERSITY OF CHICAGO

PAUL M. HARRIS

BY

JOHN HARRIS, M.D., F.R.C.S.

CHICAGO, ILLINOIS
PUBLISHED BY THE UNIVERSITY OF CHICAGO PRESS
1914

THE UNIVERSITY OF CHICAGO PRESS
CHICAGO, ILLINOIS

STUDY NO. 7

PERIODONTAL THERAPEUTICS



Digitized by the Internet Archive
in 2025 with funding from
University of Toronto

<https://archive.org/details/31761039145271>

STUDY NO. 7

PERIODONTAL THERAPEUTICSOutline - A. Periodontal Therapeutics defined

B. Main Divisions

- (a) General oral methods designed to promote reparative processes in the periodontal tissues
- (b) Establishment of the most ideal conditions of occlusal function possible
- (c) Specific remedial procedures for individual conditions or lesions present

C. Dunlop Method of Insufflation

D. Cleansing and Polishing

E. Packing

F. Bibliography

PERIODONTAL THERAPEUTICS

A. Periodontal Therapeutics defined

Periodontal therapeutics may be described as that branch of dentistry which deals with the means employed to prevent, cure or control diseases of the periodontal tissues. Hygiene has been defined as the science dealing with the preservation of health, and on the personal side in its oral relation, includes such matters as diet, oral cleanliness, special habits such as the use of tobacco, alcohol, etc., and exercise of the teeth and supporting structures. Strictly speaking, oral hygiene embraces all agencies, general and local, affecting the health of the mouth. Too frequently, however, this term is used in a restricted sense, and through popular usage, in its narrow meaning has become synonymous with oral cleanliness. Thus, oral hygiene has come to mean, for many, the personal care of the mouth as exemplified in the use of the tooth-brush, pastes, powders, and mouth-washes. It has also been extended to include the securing of the cleanliness of the mouth and teeth through the removal of calcific concretions from the exposed surfaces of the teeth, as indicated in the term, dental hygienist.

Periodontal therapeutics through its inclusion of preventive measures has, therefore, in the general sense, a hygienic phase, and also embraces, of course, treatment in the very early stages of periodontal disease. Such treatment obviously comes under the heading of prevention.

B. Main Divisions

Periodontal treatment falls into three main divisions, viz:

(a) General oral methods designed to promote reparative processes in the periodontal tissues.

(1) With wide-spread clinical sanative manifestations, e.g: the Dunlop method of insufflation.

(2) With more circumscribed manifestations of repair, e.g:

- i. Mouth-spraying
- ii. Paste-suffusion
- iii. Cleansing and Polishing
- iv. Packing
- v. Scaling
- vi. Tooth-movement
- vii. Taping
- viii. Tooth-brushing
- ix. Mouth-washing

(b) Establishment of the most ideal conditions of occlusal function possible.

(c) Specific remedial procedures for individual conditions or lesions present, viz: loose teeth, drifting teeth, and periodontal pockets.

C. (a) (1) Dunlop Method of Insufflation¹

The therapy which has proved most efficacious in the clinical experience of the writer, in the general re-establishment of tissue tone, is the Dunlop method of insufflation. In the nature of the results achieved and the rapidity with which some of the changes occur, this method, when judiciously employed excels all others. The return of gingival stippling, indicative as a rule of a subsidence of local edema, and a change of gingival color from the various cyanotic shades to a fresh or rosy-pink, both indices of recovery to a state of health, are almost invariably observed following insufflations of dry Dunlop vapor. The reappearance of these favourable signs, is, in some cases, spectacular in its rapidity.

Dunlop vapor

Dunlop vapor is a mixed gaseous substance produced by passing, under pressure, a compound vapor of oxygen, oil of peppermint, alcohol and yeast through an aqueous solution of boracic acid and the forementioned ingredients. When blown into the tissues, it is used in the dry form and at a pressure of about two atmospheres. The wet form is blown on the tissues, and at a pressure of about one atmosphere.

Apparatus described

The necessary apparatus for the insufflation and spraying procedures consists of a Cylinder of compound vapor to which is attached a mechanism that effects the admixture of this vapor and the solution, controls the vaporization of the latter, and regulates the operating pressure of the Dunlop vapor at the needle point. After opening the Cylinder Valve, the compound vapor flows to the Regulator Valve, the cylinder pressure being registered on the Cylinder Pressure Gauge. On opening the regulator valve, the vaporizing and operating pressure is adjusted to suit the requirements of administration, and is indicated on the Regulator Gauge. Next, on opening the On-and-Off Valve, the compound vapor flows into the Vaporizer and when the Dry Vapor Valve is opened, its admixture with the contained liquid takes place. The liquid becomes vaporized, and as dry Dunlop vapor, the blended vapors flow through the Rubber Tube and the Hand-piece to the Insufflation Needle. The Dunlop Vapor flows through the needle at the pressure indicated on the regulator gauge. On removing the insufflation needle, closing the dry vapor valve, and opening the Wet Vapor Valve, the Dunlop vapor is emitted as a wet spray.

Technique

The technique employed in dry vapor insufflation is delicate and precise, but is readily mastered with diligence and due attention to certain necessary details on the part of the operator. While it is subject to wide variation in its general application, nevertheless the teachings of Dunlop carefully followed and tested in a wide clinical experience by the writer, have emphasized the value of a few guiding principles. These may be briefly summarized as follows:

(a) The hand-piece is held lightly with a knife-grasp (handle-under-palm) as distinct from the pen-grasp which is never employed. It is about 3 1/2 inches long, and at the end where the rubber-tube is attached, has a raised and knurled part about three-quarter inch long which affords

a surface well adapted for gripping. In the majority of insufflations this part only is held, and the balance thus achieved makes for greater sensitivity of touch in the insufflation procedure.

(b) The insufflation needle must not puncture the epithelial covering of the gingival tissue to which it is applied. The needle is about three-quarter inch long, calibre very fine (23 gauge), and is slightly curved.

(c) The lips and cheeks, in the case of labial or buccal, and the tongue in lingual insufflations, should be so held away from the alveolar mucosa that the arrival and flow of the vapor in this and other contiguous oral mucosa is readily observed.

(d) When properly applied, the needle point is carried gently and slowly along and slightly under the gingival margin, starting at a point where the clinical crown is longest on the labial, buccal, or lingual sides. Following the curve of the gingival margin, the crest of the interproximal gingiva is approached, and as a rule, the vapor enters the tissues somewhere in the range of the last three millimeters of interproximal margin. If no flow of vapor into the tissues takes place, this frequently can be achieved by turning the needle point slightly toward the tissues and away from the tooth.

(e) The order in which the insufflations are carried out is of importance. When the molars are present, it is the established procedure to begin on the mesial of the second molars. The flow of vapor in the superficial tissues may be radiating or diffuse, but in the main is upward in the case of the upper teeth, and downward in the lowers, and forward. A post-damming effect in the neighboring posterior tissues is apparently produced, and tends to inhibit the passage of the vapor through them to far-distant regions. This factor is of value not only at the first time, if the anterior tissues are to be insufflated, but during later treatments when the introduction of increased amounts of vapor is indicated. The next site of insufflation is on the distal of the cuspids. Here the flow is mainly upward (or downward) and backward. Then insufflation is proceeded with on the mesial of the cuspids, mesial and distal of the centrals, the laterals being left until the last. On all these teeth the flow is generally upward (or downward) and widely spread.

In the lower denture, it is almost the rule, in the bicuspid region, to insufflate from the lingual, the vapor making its appearance deep down opposite the root-apices in the buccal alveolar mucosa. Supplementary insufflations when required may be given from the lingual of the incisors, with the vapor appearing in the labial alveolar mucosa opposite the root-tips. In fact, introduction of the vapor in the lingual tissues is frequently desirable in various conditions and, as a rule, may be carried out without difficulty.

(f) The introduction of the vapor may occur as a 'flash' in the tissues which is shortly followed by an arterial reddening over a large area of mucosa. Occasionally a slight blanching may intervene for a brief period. When this 'flash' occurs, the needle point should be lifted instantly from the gingival margin. At other times, the vapor

flows more slowly through the tissues, manifesting its presence under the alveolar mucosa by the gradual formation of emphysematous zones which vary in size. In these cases, the needle point may be allowed to remain at the point of insufflation for a slightly longer time, in fact the time here is governed by the size of these formations and the rapidity with which they take place. They quickly disappear with gentle massage, a rosy diffusion soon involving the entire region. Then, again, without either the 'flash' manifestation, or the appearance of the emphysematous areas, the mucosa often gradually displays a slight rubescence and it is obvious that in these examples, introduction of vapor, while unapparent otherwise, has taken place in minute quantities. Occasionally, a small region of tissue at the immediate site of insufflation becomes white, due to contraction of the capillaries in this locality. This blanching disappears in a few minutes.

(g) The vapor is never blown directly into the depth of a periodontal pocket. When, in the later stages of treatment, it is desirable to insufflate the soft tissue wall of the pocket, this may be accomplished by blowing the vapor across the pocket-mouth, holding the needle point just under the gingival margin. In general, it is good practice to attempt to reach extensively involved tissues from insufflation sites in relatively sound tissues.

A commendable attribute of this technique of insufflation is the relative freedom from local discomfort to the patient. The ease with which the tissues are infiltrated with the vapor is also an excellent feature. Utilization of the lymphatics for the carriage of oxygen and vaporized medicaments to diseased periodontal tissues is the merit of Dunlop.* The evident predilection of inflamed tissues for the vapor at the time of insufflation is in all probability a phenomenon produced by its ready passage through dilated lymphatic vessels communicating with and draining these tissues. This opinion is supported by the observation that in nitrogen insufflation, this gas flows through the tissues in much the same manner as the Dunlop vapor, and is in contradistinction to the explanation on the basis of an increased oxygen avidity possessed by diseased tissue. It is not maintained that the passage of vapor through the tissue is limited at all times to the lymphatics. The tissue-spaces and superficial venules frequently appear to act as avenues of transport.

Hyperemia and Oxygen Therapy

The pronounced clinical benefits manifested by the tissues following insufflations of Dunlop vapor have been variously explained, with the chief or sole role being assigned to some particular causal agency. The therapeutic value of artificially produced hyperemia in the treatment of local infections has long been known. The name of Bier² is ever associated with a rationale of treatment which seeks to promote the hyperemic exudation and inflammatory reaction in general. It is commonly

*Dr. William Fraser Dunlop was born in Orillia, Ontario, graduated in dentistry in 1888 from the University of Michigan, and later carried out some of his earliest investigations in Kuala Lumpur, Malay Peninsula. It was there that the foundations were laid for the development and practical application of his method of treatment for periodontal diseases.

understood that mechanical stimulation can produce an active hyperemia and undoubtedly the mechanical stimulus of incoming vapor plays a large part in the initial hyperemia of insufflation. It is impossible to state the precise mechanism involved in the vascular dilatation, and it is probable that a combination of direct and indirect actions is involved. The sustained hyperemic effect, so characteristic of the alveolar mucosa in particular, following insufflation with Dunlop vapor is in all probability due to chemical stimuli. As previously stated, the vapor contains oil of peppermint, alcohol and boracic acid. The chief constituents of oil of peppermint are menthol and menthane. Menthol is known to be a vascular dilator. Alcohol also can cause a local active hyperemia (Wells)³ and the boracic acid may act, in this relation, either directly through increase of the H-ion concentration of the tissues which environ the blood-vessels, or indirectly through increase of local CO₂ tension with vascular relaxation (Fleisch).⁴

In active hyperemia brought about in injury without infection, there is an increased flow of blood to the neighborhood providing nutritive substances and oxygen, and also favoring the mobilization of leucocytes at the site of injury. With increased rate of the blood-flow, as Ebbecke⁵ has pointed out, the temperature of the part is raised, thus promoting all cellular activities. These benefits obviously accompany the insufflation procedure.

Anoxia is the term suggested by Van Slyke to designate oxygen lack in the body from any cause. A type of anoxia occurs when the circulation rate is diminished as in impaired venous return. Wright⁶ has pointed out that in this type, stagnant anoxia, the oxygen tension in the blood is normal but the amount reaching the tissues is insufficient. With slowing down of the local rate of blood-flow, there is increased reduction of the oxyhemoglobin in the tissues, and cyanosis is produced.

In many phases of periodontal disease, venous stagnation is commonly present and the blood in the capillaries of the congested areas becomes somewhat venous in character. Factors may be present in the gingival tissues which tend to modify the cyanotic shades, e.g: the thickness of the epithelium and the presence of a stratum corneum. Indications of cyanosis are much more manifest in the alveolar mucosa where it is involved by extension of circulatory disturbance from the gingival tissues. Here the epithelium is thinner and a stratum corneum is never present. And, frequently the alveolar mucosa, in particular regions, or more or less in general, is somewhat cyanotic, with hues ranging from violaceous to bluish, and apparently unrelated to gingival changes. Here, the localized areas may be related to changes in the underlying bone. The more generalized types when manifested in both jaws are probably systemic in origin and form part of a general anoxic background. When the cyanotic tendency is confined to the upper jaw, with the alveolar mucosa of the lower jaw exhibiting a rosy color, a relationship with a disturbed circulation of the lining of the nose and maxillary sinuses may be present. This has been noted, for example, in hay-fever.

In ordinary gingival infection, the inflammatory reactions are intimately associated with the gingival crevice, and dilated, intensely congested blood-vessels are frequently present near the crevicular surface.

In these regions, the circulation rate is greatly slowed and a state of stagnant anoxia exists in the tissues.

The local metabolic consumption of oxygen is increased in inflammation, and is most likely related to the formation of cells and tissue proliferation. Adami⁷ has pointed out that the majority of cases of pronounced inflammation are examples of inadequate reaction. It therefore seems logical to believe that the introduction of oxygen via the lymphatic vessels into inflamed periodontal tissues would be beneficial to them, in fact a rationale of treatment indicated in all cases presenting signs of vascular stagnation. As oxygen is the main quantitative component of Dunlop vapor, it seems obvious that through its local administration, as in insufflation, changes in the tissues are brought about that are directly due to its increased supply.

Animal Experiments

We come now to consider certain experiments on the periodontal tissues of sheep, undertaken by the writer to determine the relative values of hyperemia and oxygen as therapeutic agencies in insufflation of Dunlop vapor. Three main experiments were carried out, and utilizing the Dunlop apparatus in each case with constant pressure of two atmospheres at the needle point, nitrogen, oxygen and Dunlop vapor were employed. In each experiment one gas only was used, and three sheep were treated, two of which were approximately five years of age and one three years. That is to say one group was treated with nitrogen, one with oxygen, and one with Dunlop vapor. And in both age-groups, sheep of corresponding ages were selected with somewhat similar clinical pictures and findings in the lower anterior region.

Before commencing the insufflations, the labial gingival tissues and alveolar mucosa associated with the lower anterior teeth were examined carefully and records made of the clinical pictures presented. Also, the lower anterior teeth were subjected to mobility tests using a special apparatus designed for this purpose, and the measurements were duly recorded. Following nine insufflations into the lower anterior gingival tissues of each sheep, and spaced on the average at two-day intervals, the mobility tests were made again and recorded. Observations were made of noticeable changes in the clinical pictures during and following each series of treatments, and the types of infiltration and reactions of the tissues were noted at the time of insufflation.

Nitrogen gas, though slightly soluble in blood and plasma, is not consumed by the tissues, and its use was suggested as a suitable means of producing the hyperemia of insufflation due alone to mechanical stimulation. Assuming that nitrogen, oxygen, and Dunlop vapor, in insufflation with constant pressure at the needle point, furnish equivalent mechanical stimuli to the blood-vessels, the component value of the hyperemia so produced when oxygen and Dunlop vapor are used may be relatively estimated. The effect of nitrogen insufflation on the gross mobility of the lower anterior teeth of the first group of sheep is shown as an increase in tightening of 2 millimeters.

In the second group of sheep, plain oxygen insufflation effected a gross increase in tightening of 7.25 millimeters. Allowing, in this increase, a hyperemic value from mechanical stimulation of 2 millimeters, the equivalent of nitrogen, there remains a value of 5.25 millimeters which must be attributed directly to oxygen therapy.

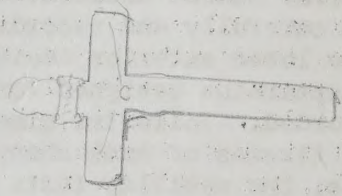
In the ... the ... of ...

The ... of ... is ...

...

...

...



...

...

Relative values of hyperemia and oxygen therapy in Dunlop insufflation

In the third group, Dunlop vapor was used, and a gross increase in tightening of 8.75 millimeters took place. In this case, the oxygen is augmented by the medicaments mentioned previously, and allowing as in the experiment with plain oxygen, a value of 7.25 millimeters, i.e: 2mm., hyperemia from mechanical stimulus, and 5.25mm., direct oxygen therapy, it may be assumed that the remaining value of 1.5 millimeters is due to hyperemia produced by chemical stimuli.

It is realized that it would be injudicious to draw too many and too arbitrary conclusions from experiments in which such a limited number of sheep were used. Nevertheless, the influence of insufflation of these gases on the mobility of the teeth has been clearly demonstrated, and in this regard, the relative values of induced hyperemia and oxygen therapy somewhat elucidated.

D. (a.2.iii) Cleansing and Polishing

Roughened surfaces of the clinical crown tend to aid the adherence of bacterial plaques and cellular and food debris to them, thus favoring under essential environmental conditions, the inception of caries, and calculus deposition. The creation of highly polished crown surfaces tends to inhibit the adhesion to them of bacterial colonies, mucin and debris. The maintenance of clean crown surfaces by the patient is thereby greatly facilitated.

Apparently there still exists a want of general conformity of opinion as to the fundamental qualities that characterize the surfaces of polished glass. The process of polishing has been the subject of considerable investigation in recent years (e.g: the works of Preston, Beilby, French⁸). According to Preston, the process, as related to glass, is chiefly one of ultra-microscopic abrasion. Beilby, on the other hand, attributes the smooth surface achieved by polishing to the effect of surface tension on the surface molecules which tend to flow under the influence of the polishing agent.

The following components are used in making the polishing combinations:

- | | | |
|----------------------------------|---------------------|----------------|
| | (Alum | - 1/2 teaspoon |
| 1. ABM mixture | -(Boracic acid | - 6 teaspoons |
| | (Magnesium sulphate | - 2 teaspoons |
| 2. Air-floated pumice | | |
| 3. Mentho-Borate paste | | |
| 4. Alcohol | | |
| 5. Oil of peppermint | | |
| 6. Carmi-Lustro Polishing Powder | | |

The polishing combinations are as follows:

Mixture No.1

Mentho-Borate paste, - approximately 1/4 teaspoon
 ABM mixture, - approximately 5 grains on tip of a spatula
 Oil of peppermint, - 1 drop
 Alcohol, - 4 drops
 Air-floated pumice, - sufficient to make a very stiff paste

Mixture No.2

Mentho-Borate paste, - approximately 1/4 teaspoon
 ABM mixture, - approximately 5 grains on tip of a spatula
 Oil of peppermint, - 1 drop
 Alcohol, - 4 drops
 Carmi-Lustro Polishing Powder, - sufficient to make a very stiff paste

Mixture No.3

Carmi-Lustro Polishing Powder

Regardless of lack of information as to the exact nature of the changes involved in the production of highly polished surfaces on the enamel, it is apparent that their establishment in the oral cavity is highly desirable. To name but one advantage thus acquired, as pointed out by Burchard and Inglis⁹, "the smoother the surfaces of the teeth are made, the longer the redeposition of calculi will be delayed."

The following technique of polishing when thoroughly executed is productive as a rule of an extremely smooth and lustrous surface. The finest result would seem to depend, to some degree upon the quality of the surface enamel. It is understood of course that it may not always be expedient or necessary to carry out the technique to the final stage.

Technique

The complete polishing procedure is divided into three steps. These are as follows:

(a) Use of Mixture No. 1

Using special rubber cups (e.g: Davis; WW Prophylactic in the contra-angle handpiece, the exposed surface of the clinical crown is first carefully cleansed with mixture No.1. This ensures the removal of all stains and plaques before the production of a uniformly smooth surface, mainly on the enamel, is attempted.

For the detection of plaques and adherent debris on the tooth surface, the use of a disclosing solution is recommended. The solution advocated by Skinner is quite effective in this regard, and is comprised of the following:

Iodine crystals	3.3 gm.
Potassium iodide	1.0 "
Zinc iodide	1.0 "
Glycerine	16.0 "
Distilled water	16.0 "

Following the gentle drying of the crown surfaces to be tested, including as a rule, several teeth at a time, the disclosing solution is applied on a pledget of cotton and the mouth then rinsed with one mouthful of water. The plaques, through their deep brown staining, are clearly demarcated on the unstained, clean enamel surface.

The rubber cup, through shape and size, lends itself to the polishing of the enamel or crown surface of the gingival third. And due to its flexibility, slight pressure tends to force the edge of the cup beneath the gingival margin. In this way, the subgingival enamel is cleansed and polished. This is accomplished with a minimum of trauma to the gingival tissues. The writer does not advocate the use of brush wheels for the enamel surface adjacent to the gingival margin.

The use of hardwood toothpicks is recommended in the polishing operation, and the writer has found them almost indispensable for the proximal surfaces. The World's Fair and Hercules type of round toothpick can be used in both long and contra-angle handpieces. The No.1 polishing mixture is carried on the point of the toothpick to the proximal surfaces and with gentle guidance of the rapidly revolving wooden point, a clean and smooth surface is soon produced.

Small areas of enamel are occasionally encountered which appear to exhibit an etched or slightly roughened surface. These may be made smooth more quickly by adding a little pure air-floated pumice to the mixture. This is easily accomplished by dipping the rubber cup full of No.1 mixture into the pumice. When the enamel surface generally, manifests a certain quality of smoothness, best determined by the feel of the revolving rubber cup on the enamel, the second stage of the polishing procedure has arrived.

(b) Use of Mixture No.2

With this mixture in the rubber cup, the polishing operation is continued as before. In a few minutes an extremely smooth surface is produced. Then, the mouth is thoroughly flushed with water in order to remove all this material from the tooth surfaces.

(c) Use of Mixture No.3 (Carmi-Lustro Polishing Powder)

As a rule, polishing with Carmi-Lustro is confined to the labial surfaces of the upper and lower anterior teeth. In contradistinction to mixtures Nos.1 and 2, the Carmi-Lustro is used dry. With cotton rolls under the lips, the surfaces of the teeth are carefully dried. Also, a dry rubber cup is employed. This is filled with Carmi-Lustro powder and applied to the tooth surface at short intervals, and at high revolving speed. In a very short time, in some cases only a matter of seconds, the enamel presents a surface of exceptional lustre.

When the teeth have once been thoroughly polished with mixtures Nos.1 and 2, it will be found that later when the tooth surfaces require further cleansing, the use of No.2 mixture is usually all that is required to restore the enamel to its former glossy state. The establishment of a very smooth enamel surface, and its maintenance, as previously described, would seem to be greatly preferred to the repeated use of pumice, or pumice mixtures only, from time to time.

E. (a.2.iv) Packing

The procedure of packing with paraffin originated with the late Dr. W. F. Dunlop, who, as stated previously, introduced his method of insufflation to the dental profession.

Materials and Equipment -

(a) The surgical dressing (Pocket Pak) consists of a paraffin base in which boracic acid, oil of peppermint and other medicinal agents including oxygen have been incorporated. It is made in the form of sticks, and two sizes are in common use. The first and larger size is for use in a syringe, and the second is employed where application by the fingers is indicated.

(b) The writer some years ago felt the need of a universal type of dressing applicator for the syringe ordinarily employed, and following its design by Mr. E. C. Platt, has introduced a special type of needle point for the ready insertion of the dressing into gingival crevices, pockets and interproximal spaces.

The connecting tube of this applicator is of goose-neck shape which in itself makes for a more universal application of the paraffin dressing in the oral cavity. The needle point proper is approximately 15 mm. long, and is tapered and so constructed to shape the softened paraffin in the form of a fine ribbon. It is threaded into a universal joint which allows a revolving movement of the point proper. This permits a great variation in the adaptation of the needle opening to the mouth of the periodontal pocket. Also, the increased bulk of metal in this joint, contributes, through its heat, to the steady flow of the paraffin dressing at the proper consistency through the needle point.

Technique

When the paraffin is inserted by digital pressure, it is usually in regions where open spaces are present interproximally or underneath pontics in bridgework. The smaller paraffin stick which is employed in these cases is first warmed in water at 125° F. It is then forced into the spaces, and pressed on each side with the fingers so that it is uniformly packed, and held in position by interlocking. The writer advocates its retention for 24 to 48 hours. At this time, or later, a second application may be made. Calculus deposits made accessible by this process should be removed by scaling, and the packings continued until the tissues become healthy.

Interproximal packing, as a rule, is best accomplished with the aid of the syringe. After inserting the paraffin stick in the barrel of the syringe, and replacing the piston, the syringe barrel and point are submerged in water at 125° F. until the paraffin dressing flows freely. In the bicuspid and molar regions, interproximal crevices and spaces, with the exception of the lower left, are usually approached from the lingual. In the upper bicuspid and molar regions, and the lower right, the tip of the index finger of the left hand is held on the buccal embrasure and the paraffin is forced through from the lingual. When the lingual embrasure is filled, the tip of the index

finger of the right hand is placed there, and under pressure of both finger tips, the paraffin dressing is forced to the depths of the crevices. The excess is carried occlusally over the contact points and trimmed off. The lower left bicuspid and molar region is usually approached from the buccal, with the tip of the index finger of the left hand on the lingual embrasure and the procedure carried out as before. In the upper and lower anterior regions, the tip of the index finger of the left hand is usually placed on the lingual embrasures, with the thumb of the same hand pressing from the labial.

In the case of packing the pockets, the needle point is introduced into the mouth of the pocket, and the soft warm paraffin dressing is gently forced deep into position. The elasticity of the soft tissues tends to eject the paraffin plug from the pocket, and it is usually necessary to employ some device for holding the material in place. In certain positions where the pocket faces a space, e.g: distal of an upper cuspid with a first bicuspid extraction space, the use of a ligature is indicated. A No.5 grassline ligature is made to encircle the tooth, and is knotted several times over the pocket mouth. The paraffin is introduced into the pocket, and its extrusion is prevented by the knots. A small piece of paraffin is sometimes placed over the knots and joined to the original plug in the pocket. This makes for its added stability in position.

Where a diastema exists and pockets are present, the retention of the paraffin dressing is ensured by first applying the ligature to each tooth and tying two or three knots in the interproximal space. The pockets are then filled with paraffin which is held in position by a further deposit of the same material. This is inserted under the ligature and over the knots with sufficient pressure to join it with the plugs in the pockets.

The paraffin dressing may be held in pockets in other exposed positions, e.g: labial of upper and lower anterior teeth by first trimming away all the excess and carefully drying the surface of the gingival tissues, paraffin, and gingival third of the crown. These surfaces are then coated several times with copal varnish, 25 per cent (alcoholic), and after the alcohol has evaporated, the resin is precipitated on the application of water. This makes a fairly tenacious covering and is of considerable value in keeping the paraffin plug in position. It may also be used in conjunction with the ligatures.

The paraffin dressing is changed under certain conditions, every day or every other day, as the effect is usually at a minimum by then, but occasionally it may be left a little longer. When this treatment is used for two or three weeks, in many cases results are achieved that resemble the clinical appearance of the soft tissues following gingivectomy. The writer has produced results through paraffin packing that frequently have been mistaken for those effected by surgery. Kronfeld¹⁰ has called attention to the use of paraffin dressing in conjunction with surgical treatment. He has stated: "In case of isolated deep pockets where Pocket-Packer alone does not suffice, it is desirable to excise from the pocket wall a small wedge-shaped piece and to insert Pocket-Packer in the opening down to the base of the pocket. Hygienic conditions may be restored thus in a very short time."

Relation of paste suffusion to packing (a.2.ii)

When the gingival crevices or pockets are first filled with a special paste (i.e: Mentho-Borate), and thoroughly flushed with it, before the paraffin packing is inserted, it will be found that some of the tissue changes will occur with greater rapidity. This particular paste contains glycerine, boracic acid, oil of peppermint, oxygen and other agents, and is best carried to the crevices and pockets by means of a syringe and curved needle. Through its glycerine content, the paste is dehydrating and tends to reduce gingival edema and swelling. The oil of peppermint, through its menthol component is a vascular dilator and tends to induce a mild hyperemia in the soft tissues. The oxygen, of course, is antagonistic to anaerobic conditions existent in the pocket. As all the components in the paste, except glycerine, are present in the paraffin packing, when used in conjunction with it, it blends with the warm dressing, and is thus permitted to exert its effects over a longer period of time.

Benefits of the Packing Procedure-

The following are some of the benefits that attend the use of paraffin packing:

- (1) It acts in a favourable manner mechanically, first, by separating inflamed soft tissues from the dental wall with its calculus and septic surfaces, and secondly, by overspreading these inflamed surfaces with a bland coating. Both of these new conditions favor the reparative process as shown in the rapid healing of the ulcerated crevicular surface in suppurative pockets or crevices.
- (2) It acts mechanically through pressure, which in itself, as Gottlieb¹¹ has pointed out, seems to exert a considerable influence. Rapid reduction of gingival swelling usually takes place with consequent shallowing of the pocket depth. Through continued packing under fairly heavy pressure, an atrophy of the gingival margin may be produced. In fairly shallow pockets, this is greatly to be desired, and this value is due in no small degree to the physical nature of the paraffin dressing.
- (3) By dilating the pocket orifice, scaling is greatly facilitated. Deposits of calculus are rendered more accessible, and their removal can be accomplished with much less traumatization of the soft tissues than takes place under ordinary scaling conditions.
- (4) It acts as a seal, and keeps saliva and food particles from entering the pocket, thus preventing the re-establishment of septic processes while the tissues are undergoing repair.
- (5) Through its contained medicaments, it tends to inhibit anaerobic infection, is soothing to the tissues, and stimulates their circulation.

E. Bibliography

1. Box: The Dunlop Method of Insufflation in Periodontal Therapeutics, October, 1937.
2. Bier: Die Hyperaemie als Heilmittel, 2nd edition, Bonn, 1905.
3. Wells: Chemical Pathology, W. B. Saunders Company, 1920.
4. Fleisch: Die Wasserstoffionenkonzentration als peripher-regulatorisches Agens der Blutversorgung, Zeitschr. f. allg. Physiol., 19, 269, 1921.
5. Ebbecke: Die locale vasomotorische Reaktion (L.V.R.) der Haut und der inneren Organe, Pfl. Arch. 169, 1-81, 1917.
6. Wright: Applied Physiology, fifth edition, Oxford University Press, 1934.
7. Adami: Inflammation, Macmillan and Co., 1909.
8. Twyman: Lens, the Encyclopaedia Britannica, vol. 13, 14th edition.
9. Burchard and Inglis: Dental Pathology and Therapeutics, Lea and Febiger, 1926.
10. Kronfeld: Die Dunlopsche Behandlungsmethode von Zahnfleisch-erkrankungen, Zahnaerztliche Rundschau, Berlin, Feb., 1928.
11. Gottlieb: Die Dunlop-Methode zur Behandlung der diffusen Atrophie und der Gingivitis ulcerosa, Zeitschrift für Stomatologie, Heft 1, xxvi - 26. Jahrgang, 1928.

STUDY NO. 8

CASE MANAGEMENT OF SIMPLEX AND COMPLEX PERIODONTITIS

STUDY NO. 8

CASE MANAGEMENT OF SIMPLEX AND COMPLEX PERIODONTITIS

Outline - A. First Phase - Examination

1. Radiographic survey
2. Pulp vitality tests
3. Study casts
4. Clinical oral inspection

B. The Significance of Tooth Mobility in Diagnosis

- (a) Nomenclature
- (b) The syndromes of Simplex and Complex Periodontitis
- (c) Factors governing the tightness of the tooth
- (d) Relation of mobility of the tooth to differential diagnosis
- (e) Vitamin deficiency and the clinical picture

C. The Gingival Tissues: The Meaning of "Stippling" and "Lack of Stippling"

- (a) The normal gingival surface
- (b) Gingival edema
- (c) McCall's Festoons

D. The Determination of Pocket-Depth and the Relation of the Pocket-Base to the Bone Edge

E. Bibliography

CASE MANAGEMENT OF SIMPLEX AND COMPLEX PERIODONTITIS

A. First Phase - Examination

1. Complete radiographic survey of the teeth and alveolar structures.
2. Pulpal vitality tests of all the teeth.
3. Study casts mounted in an articulator - Hanau Articulator and Technique¹ preferred by the writer. This makes possible an exhaustive examination of the patient's occlusions and articulations.
4. Clinical examination:
 - i. Determination of tooth mobility.
 - ii. Survey of the soft tissues: color; edema; pocket depth.
 - iii. Salivary tests; pH etc.
 - iv. Study of surface markings or defects on the crowns

B. The Significance of Tooth Mobility in Diagnosis

(a) Nomenclature in periodontal disease is of value only when there is an understanding of the associated pathological changes in the periodontal tissues. Without this fundamental information, it is not feasible to discuss in an intelligent manner such problems as symptoms, differential diagnosis and therapy. Any discussion of these subjects, obviously, must rest upon a knowledge of periodontal pathology and etiology.

As mentioned in a previous study in this series, the writer first used the term 'periodontium' to designate the supporting tissues of the teeth. The three essential tissue-components of the periodontium, on this distinct basis, are the gingivae, the periodontal membrane or pericementum, and the alveolar process. By the term 'periodontitis' is denoted an inflammation of the periodontium, and a disease so designated involves all three components.²

Chronic periodontitis of the pocket-producing type may be divided into two main classes which differ greatly in the aggregate of associated symptoms. These are known as Simplex and Complex Periodontitis.

(b) The syndromes of Simplex and Complex Periodontitis

The syndrome, or grouping of associated symptoms, in Simplex Periodontitis is essentially as follows:

1. Gingival inflammation dominates the clinical picture; calculus is frequently present in abundance.
2. It is characterized, as a rule, by a fairly even distribution of sites, when these tend to become localized by such factors as inadequate oral

cleanliness, e.g: on the unused side where there is mastication on one side only, and mouth breathing. Isolated lesions are frequently associated with such factors as food-impaction and the injudicious use of the toothpick.

3. Increased mobility of the tooth in its alveolus is relatively a late symptom in the progress of the disease.
4. Pocket formation is frequently an early symptom; usually slower in development than the pocket of Complex Periodontitis; in the early stages, it usually tends to be wide, and shallow, and shows a special predilection for the interproximal tissues.

The syndrome in Complex Periodontitis is as follows:

1. Increased mobility of the tooth in its alveolus is an early sign.
2. A tendency to axial extrusion or lateral drifting with the formation of diastema is a premonitory sign.
3. It is characterized by an uneven distribution of sites which appear, as a rule, to be localized by traumatogenic occlusion.
4. Gingival inflammation, in the early stages, is frequently an inconspicuous feature.
5. Pocket formation, as a rule, is a relatively late symptom, but it is frequently of fairly rapid development; it is often deep, and narrow with its base variable in position in relation to the pocket orifice; and it occurs, as a rule, on the side of tension or pull.

In an advanced state, Simplex and Complex Periodontitis usually cannot be differentiated, so it is, therefore, of the greatest importance to distinguish them clinically in the early stages.

(c) Factors governing the tightness of the tooth³

The tightness of the tooth depends upon the following factors which are listed in the order of their importance:

1. the narrowness of the periodontal membrane
2. the height of the alveolar process
3. the rigidity of the periodontal membrane.

On this basis, it is inferred that if two teeth have equal bone height, the one with the narrower membrane will be the tighter tooth. And if two teeth have membranes of equal width, the one with the greater bone height will be the tighter tooth. The tightness varies directly as the rigidity, but this factor has the least bearing on the mobility of the tooth. This is well exemplified in the case of the long-standing functionless tooth. Through transformation of the fiber bundles in the periodontal membrane into loose connective tissue, there is a decrease in rigidity, but owing to the great decrease in width of the membrane, the tooth exhibits a marked degree of tightness in its alveolus.

(d) Relation of mobility of the tooth to differential diagnosis.

In Simplex Periodontitis, the primary and dominating lesion is an inflammation of the gingival tissues. With advance of this inflammatory process, the alveolar crest is progressively resorbed, i.e: there is a decrease in bone height. However, as the deeper tissues - bone and periodontal membrane - remain intact, the tooth shows little or no increased mobility in the early course of the disease.

In Complex Periodontitis, the primary and dominating lesion occurs in the periodontal membrane and involves the adjacent alveolar bone through resorptive changes, i.e: there is an increase in the width of the periodontal membrane. This is indicated clinically, as a rule, by an increased mobility of the tooth in its alveolus, in the early progress of the disease. According to Professor Synge, the looseness varies as the cube of the thickness of the membrane, and in consequence, a slight loss of bone on the wall of the alveolus would soon be evidenced as an increased mobility. Increased mobility of a tooth in its alveolus, therefore, is a sign of great importance in periodontal diagnosis.

(e) Vitamin deficiency and the clinical picture.

It is obvious that the phenomenon known as traumatogenic occlusion must be found clinically in varied environmental backgrounds as far as the periodontal structures are concerned. These range from the normal state to alterations of tissue function in various ways, e.g: vitamin deficiency, hormonal disturbance and other systemic conditions. The influence of these states on the reparative and maintenance processes in the periodontal tissues must modify the effects of traumatogenic occlusion, and thus exercise a bearing on the associated clinical picture.

Sinclair⁴ has pointed out recently that in vitamin C deficiency, drifting of the teeth with establishment of traumatogenic occlusion is a salient feature. Bleeding of the gingival tissues and oral mucosa are also to be noted. And, according to this writer, in mature periodontal disease accompanying vitamin A deficiency, drifting of the teeth does not occur and traumatogenic occlusion is not pronounced. Bleeding of the gingival tissues is not marked or is absent altogether. Sinclair has stated that his experience strongly suggests that 'complex periodontitis' is the result of a multiple vitamin deficiency, i.e: a polyavitaminosis.

Normal physiological occlusion is present when the periodontium is able to withstand the forces of occlusion without the initiation of pathological changes in the periodontal tissues. The writer⁵ stated some years ago that in a large measure our understanding of traumatogenic occlusion depends upon the proper appreciation of this tenet. It seems evident that when the reparative or maintenance capacity of the periodontal structures is diminished, the resistance of these tissues to the occlusal force is lowered. The stability of the individual tooth, (in particular the one in traumatogenic occlusion), and of the dentition as a whole is thus endangered. The first is expressed in terms of increased mobility and the second in diastema formation.

Recently, in a discussion, with the writer, of the problem of bone maintenance, Doctor Ham*# has expressed his viewpoint as follows: "The effect of a dietary deficiency of a mineral or a vitamin is usually studied, so far as bone is concerned, in a young growing animal. This practice cannot help but give rise to the impression that deficiency diseases affect the skeleton to a serious degree only during the growing period. Whereas the effect of a deficiency is much more marked during growth, it is by no means absent in adults. This is because the structure of bone is always changing, old bone is continually disintegrating and being removed, and its place taken by newly formed bone. This process of replacement is slow. It may take many months or years in an adult bone before its structure is so weakened by the poor quality of, or lack of replacement bone, to weaken the bone as a whole so that it is unable to bear its load. Hence, in long continued slight vitamin C deficiency, or in shorter moderate deficiencies, bone which normally wears out, is only meagerly replaced. In due time it becomes unable to bear its load and obvious lesions appear."

It is of interest to note that Boyle⁶ in a recent paper, has stated: "Vitamin C deficiency is the only nutritional deficiency which in our experience produces the characteristic features of the systemic type of pyorrhea in experimental animals." This investigator found that in experimental animals fed for several months on diets containing sub-optimal levels of ascorbic acid, certain teeth, chiefly the molars, suffered displacement. This demonstrated the inability of the periodontal structures to withstand the forces of function. The histologic picture showed rarefaction of the alveolar bone, and reduction in numbers of the collagen fibers in the periodontal membrane. This was evidenced clinically by gross mobility of the teeth.

C. The Gingival Tissues: The Meaning of "Stippling" and "Lack of Stippling"

(a) The normal gingival surface

Orban demonstrated that normally the gingivae present a keratinized surface. This is in contradistinction to the oral mucosa in general which is not covered in this manner. This keratinized layer of the gingival tissues is known as the stratum corneum. This layer is parallel to the underlying stratum malpighii and therefore presents a wavy surface. The crests of the tiny waves form rounded elevations which in general overlie the connective tissue papillae. The summits of the papillae carry the capillary loops,⁷ and owing to the relative thinness of the epithelial covering, are frequently fairly close to the surface. The crests of the surface undulations, and the depressions, give to the normal gingival tissues, when dried, an attractive^{velvety} or mossy surface. The color is not a uniform pink but presents a translucent appearance of alternating spots of lighter and darker shade. The writer⁸ has given to this state of the gingival surface, the term "stippling".

* Personal communication

A. W. Ham, M.B., Associate Professor of Anatomy, University of Toronto

From the foregoing, it is hardly necessary to point out that, as the pocket base cannot be determined through the position of the resorbed bone edge in the radiograph, such a procedure is unreliable unless supplemented by the use of some radiopaque material in the pocket. And further, this material must be present at the pocket base when the radiograph is made. The writer has tried a paste comprised of barium sulphate, sodium oleate, tragacanth and glycerine and found it quite satisfactory for this purpose. This paste is introduced into the pocket with a syringe and a fine curved needle. However, to ensure full penetration of the pocket, it was discovered that the gingival margin must be held firmly to the tooth when the paste is inserted. This required the devising of a special instrument to adapt and hold the soft tissue margin of the pocket mouth to the tooth surface while the curved needle of the syringe is in position. When the procedure is properly carried out, it was found that the pocket base and the bone edge are clearly differentiated in the radiograph.

E. Bibliography

1. Hanau: Dental Engineering, Vol. 1, 1926.
2. Box: Studies in Periodontal Pathology, Bulletin No. 7, Canadian Dental Research Foundation and Department of Health, Province of Ontario, May, 1924.
3. Box: The Pericementum as Influenced by Physical Functional Modifications, The International Journal of Orthodontia and Dentistry for Children, June, 1933.
4. Sinclair: Vitamin A and B Deficiency - An Etiologic Factor in Acute, Subacute and Chronic Vincent's Infection and other Dental Conditions, The Journal of the American Dental Association, October, 1939.
5. Box: Treatment of the Periodontal Pocket, The University of Toronto Press, 1928.
6. Boyle: Dietary Deficiencies and Diffuse Alveolar Atrophy, The Journal of the American Dental Association, September, 1938.
7. Box: Studies in Periodontal Pathology, May, 1924.
8. Box: Signs of Incipient Periodontal Disease, Canadian Dental Research Foundation, May, 1924.
9. Wells: Chemical Pathology, 4th edition, W. B. Saunders Co., 1920.
10. Amberg: Zeit. exp. Med., (2) 19, 1913.
11. Kronfeld: Histopathology of the Teeth and Their Surrounding Structures, Lea and Febiger, 1933.
12. Box: Treatment of the Periodontal Pocket, The University of Toronto Press, 1928.

STUDY NO. 9

CASE MANAGEMENT: EXAMINATION CONTINUED

STUDY NO. 9

CASE MANAGEMENT: EXAMINATION CONTINUEDOutline - A. Interpretation of Certain Acquired Defects of the Hard
Tooth Substances

- (a) Miller's definitions
- (b) Certain characteristics of the tissues involved
- (c) Conditions that can produce true wastings
- (d) Classification of main defects
- (e) Interpretation of these defects

B. Suggestions as to Prophylaxis and Therapy

- (a) Cervical (wedge-shaped) defects
- (b) Enamel surface defects
- (c) Decalcifications

C. Bibliography

CASE MANAGEMENT: EXAMINATION CONTINUED

A. Interpretation of Certain Acquired Defects of the Hard Tooth Substances

(a) According to Miller's definition,¹ the term "wasting" is used in a collective sense to designate any kind of slow and gradual loss of tooth substance, characterized by a smooth, polished surface, without reference to the cause of such loss."

Miller also defined erosion as "the superficial chemical disintegration of tooth-substance"; and abrasion as "a slow gradual wasting away of tooth tissue by friction." When the abrasion is caused by the friction of the tooth surfaces in mastication, it is termed "attrition".

This investigator has stated, in other words, that "wasting produced by mechanical agents is equivalent to 'abrasion': by chemical agents, to 'erosion': by mechanical and chemical agents combined, to 'chemico-abrasion'."

(b) Certain characteristics of the tissues involved

1. Enamel is much harder than the cementum or dentine.
2. Enamel is sparse in organic matter as compared to cementum or dentine.

Tomes² has stated: "Upon the outer surface of the dentine, the enamel forms a cap of a very much harder and denser material. In its most perfect form, it is by far the hardest of all tissues met with in the animal body, and at the same time the poorest in organic matter. It has usually been stated that in the enamel of a human adult tooth there is from 3.5 to 5 per cent. of organic matter but this is, as will presently appear, an error, there being probably only about 1 per cent."

Hodge and McKay³ employing a special instrument known as a micro-character made numerous determinations of the hardness of enamel, dentine, and cementum. They found that the outer covering of enamel was considerably harder than the middle or innermost regions. This appears to be in harmony with the findings of Thewlis,⁴ who demonstrated at the National Physical Laboratory, London, "that there is a radiographically dense skin of enamel over the outer surface." Compared to the cementum, Hodge and McKay found this outer enamel to be approximately 22 times harder, and compared to dentine, approximately 14 times. As compared to the underlying middle enamel, it was found to be twice as hard.

According to the analyses of Von Bibra,⁵ enamel, dentine, and cementum consist of the following chemical constituents:

Enamel -	Calcium phosphate	89.82
	Calcium carbonate	4.37
	Calcium fluoride.....	traces
	Magnesium phosphate.....	1.34
	Other salts	0.88
	Organic matter.....	3.39
	Fat.....	0.20
Dentine -	Basic calcium phosphate	66.72
	Calcium carbonate	3.36
	Calcium phosphate	1.08
	Sodium salts	0.83
	Organic matter.....	27.61
	Fat.....	0.40
	Calcium fluoride	traces
Cementum -	Calcium phosphate	58.73
	Calcium carbonate	7.22
	Magnesium phosphate.....	0.99
	Other salts	0.82
	Organic matter.....	31.31
	Fat.....	0.93
	Calcium fluoride	traces

From these analyses, it is to be noted that the ratio of organic to inorganic content in these three hard tissues is as follows:

	<u>Organic</u>	<u>Inorganic</u>
Enamel	3.59	96.41
Dentine	28.01	71.99
Cementum	32.34	67.76

This particular finding of 3.59 parts of organic matter in enamel in all probability does not represent the facts when the difficulty of freeing enamel from adherent dentine and cementum is considered. The question of adherent secondary enamel cuticle and penetrating lamellae must also be taken into account. Nevertheless, from the foregoing, it is shown that cementum and dentine are much richer in organic material than enamel.

In a consideration of the comparative influence of abrasive action on the enamel and cementum, it is apparent, because of its relative softness, that the cementum at the neck of the tooth, is more liable to wasting through wear. Here the cementum is frequently exposed through the processes of eruption or recession. Dentine, also, is more prone to attack by frictional agencies.

Enamel, on the other hand, is more prone to disintegration by acids than cementum. When its surface has undergone some decalcification, such enamel is more liable to frictional action. However, according to Miller, "wasting of the dentine is not accelerated by the action of acid." He has stated that "it may even be retarded or prevented altogether." This is obviously due to the high organic content of dentine and should be true of cementum also.

Section 1 - ...
...
...
...
...
...
...

Section 2 - ...
...
...
...
...
...
...

Section 3 - ...
...
...
...
...
...
...

The above ...
...

...	...	...
...	...	...
...	...	...
...	...	...

The ...
...
...
...
...
...
...

In ...
...
...
...
...
...
...

Section 4 - ...
...
...
...
...
...
...

The relation of agents that disorganize organic material would seem to be highly significant in regard to cementum and dentine. Miller has stated: "Substances that attack the organic constituents of the teeth (heat, hydrogen dioxide, strong alkalis) make the teeth friable and consequently more liable to wear by friction."

(c) Conditions that can produce true wastings, i.e: defects that present a highly polished surface

1. Friction or abrasion, i.e: the operation of mechanical factors, e.g: tooth brush and dentifrice; artificial dentures; clasps, etc.
2. Chemico-abrasion, in which the mechanical factor keeps pace with the chemical factor of disintegration or decalcification

The process of decalcification, acting alone, makes the enamel surface rough, easily crumbled, and chalky-looking when dried. It softens the dentine. It therefore does not produce, by itself, a wasting. Erosion, then, according to the definition of Miller, is never a true wasting.

(d) Classification of main defects

The chief defects to be observed fall into ^{three} classes:

1. Those that begin in the cementum, where this tissue is exposed at the neck of the tooth. These are known as wedge-shaped defects. They resemble a notch made by a file, and begin as minute indentations, more or less sharply defined, and usually sensitive to the touch. The base is invariably smooth and highly polished.

2. Those that originate in the enamel surface. They range from flattened areas that affect the entire enamel surface, to saucer-shaped, egg-shaped, or heart-shaped cavities with a polished base.

3. Defects ^{on the enamel surface} that appear whitish when dried, are easily pulverized, and are rough to the touch.

(e) Interpretation of these defects

From the foregoing, these defects may be explained as follows:

1. The wedge-shaped defects, because of their inception in the cervical cementum and dentine, and the smooth and shiny nature of their surfaces, are produced largely through abrasion, e.g: horizontal brushing with coarse pastes and powders. (See the exhaustive work of Hirschfeld) The actual wasting may, in many instances, be preceded by chemical changes produced by alkalis, e.g: strongly alkaline dentifrices or other substances.

2. The smooth, flattened and irregular concavities on the crown are mainly chemico-abrasions. The decalcifying process, initiated by acid secretions from mucous glands, or other acid agencies, is paralleled by abrasive action, and in consequence there is produced a true wasting. As these lesions favor the labial and buccal surfaces of the teeth, as pointed out in a previous study, it seems reasonable that acid secretions in the vestibule, including parotid saliva, may play a part in their causation.

3. The whitened areas, often slightly rough to the touch, the enamel being more or less easily crumbled, are decalcifications produced through caries or other process, and are true erosions. The whiteness is usually regarded as indicative of enamel loss, chiefly cementing substance. Frequently there is loss of continuity of surface as manifested by the marked unevenness of surface.

B. Suggestions as to Prophylaxis and Therapy

(a) Cervical defects (wedge-shaped)

In the prevention of these lesions, it would seem reasonable to instruct the patient in a method of tooth-brushing designed to minimize the friction on exposed cemental surfaces. Non-cellular cementum is relatively very thin and its removal is obviously a matter of little difficulty under certain conditions. Strenuous cross-brushing should be avoided. The dentifrice employed should contain fine abrasives, if any, and its reaction, in the writer's opinion, should be approximately neutral. In other words, strongly alkaline dentifrices should not be employed.

(b) Enamel surface defects

Here also the patient should be instructed in a proper method of brushing. The dentifrice should not be unduly abrasive or excessively acid in reaction. The pH of the saliva and the secretions of the labial glands in particular should be determined. Frequently a relationship between acid mucous secretions of the upper lip and wastings on the enamel surface of the upper anterior teeth seems apparent. However, at the present time, these reactions, viz: resting saliva and mucous secretions, cannot be changed by any therapeutic method known to the writer.

Where incipient defects are discernible on the enamel surface, the following protective solution is recommended. This prescription is given to the patient.

R _x	Sodium oleate neutral.....	3 iiss	(ounce)	1 1/2
	Glycerine.....	3 iiv	(ounces)	4
	Rectified spirit.....	3 vi	(ounces)	6
	Hot water.....	3 vi	(ounces)	20
	Oil of peppermint.....	M xx	(minims)	20
	Oil of wintergreen.....	M xx	(minims)	10
	Oil of cloves.....	M x	(minims)	1/2
	Ess. vanilla.....	3 ss	(ounce)	
	Sol. carmine.....	q.s.		

M.

Sig: 10 to 15 drops on a wet brush to be used as a dentifrice on retiring.

This solution appears to offer the following advantages:

1. It is detergent
2. It lubricates the bristles of the tooth-brush, thus permitting them to pass to the depths of the embrasures with a minimum of pressure.

3. It lacks abrasives, thereby eliminating friction from this source.

4. It is adsorbed on the tooth surface as a film of sodium oleate. This apparently undergoes dissoociation, leaving on the tooth an extremely thin coating of oleic acid. Hawk and Bergheim⁶ have stated that "soaps of the higher fatty acids can exist only in solutions of pH 9, or greater alkalinity." According to the writer's tests, such reactions are more alkaline than are ever attained by the saliva. Oleic acid is an unsaturated fatty acid, and is colorless, tasteless and odorless, and is insoluble in water. It is known that fatty substances lower surface tension (Seifriz).⁷ It has been demonstrated by experiments in our laboratory that a film of oleic acid on the enamel surface, in vitro, will protect against acid attack for some days.

The hypersensitivity of the surface of certain wastings is usually promptly relieved by the use of pure formalin. The surface of the tooth is first carefully dried, and, using an orangewood stick, or wood point, dipped in the formalin, the surface of the wasting is gently but thoroughly rubbed, allowing sufficient time for penetration of the medicament. In the case of wedge-shaped defects care should be taken to avoid rubbing the gingival margin. In the posterior teeth, the use of silver nitrate for these defects is recommended. It acts as an analgesic and appears to retard the process of disintegration.

(c) Decalcifications and incipient cervical caries

1. Where decalcifications are still in the early stage, i.e: the surface continuity has not been broken, and where the caries process is still in the "white spot" stage, the remineralization powder of Andresen may be tried. This powder has also been recommended for wastings of the chemico-abrasion type. The formula is as follows:

Tartaric acid.....	448 grams
Solution of gelatine, 10%.....	50 grams
M. and ad.	
Precipitated phosphate of calcium	
Precipitated carbonate of calcium	
Basic carbonate of magnesium aa.....	160 grams
M. sic. and ad.	
Bicarbonate of sodium.....	560 grams
Chloride of sodium	160 grams
Corrigents of taste, ad libitum	
M., sic.	

White, effervescing, mineralizing anti-carieticum. One tenth of the above quantity is sufficient for the use of a single patient for three months.⁸

About one gram of the powder is dropped on the tongue, thoroughly mixed with the saliva which is then flushed throughout the mouth to reach all the crown surfaces. The excess only should be expectorated. It is recommended to be used at night before retiring, and following the regular cleansing of the teeth.

2. The writer is using in practice a product known as Enzodent (Squibb) in cases of early decalcification and caries in the "white spot" stage. This preparation is buffered and enzyme-bearing. Through its amylase content, it is designated to render adherent food debris and plaque material free from starch and dextrins. In a limited number of cases, the writer has observed apparent benefits and it would seem that further investigations along these lines are warranted.

When extensive amounts of tooth substance are lost through defects belonging to the three classes previously described, it is obvious that these regions should be filled. In the case of decalcifications and incipient caries, the use of an alkaline mouth wash may be indicated. The writer recommends either pure lime water, or a mouthwash based on the following prescription:

R _x	Sodii bicarbonatis	3 iiss	(drachms)	1 1/2
	Ammonii carbonatis	Gr. vj	(grains)	6
	Tr. myrrhae	3 j	(drachm)	
	Aq. coloniensis	3 iij	(drachms)	
	Aq. lavandulae	j	(drachm)	
	Aq. destillat. ad	vj	(ounces)	
	M. et filtra			

Directions - To be used with an equal volume of water as a mouth wash as directed.

C. Bibliography

1. Hirschfeld: The Toothbrush - Its Use and Abuse, Dental Items of Interest Publishing Co., 1939.
2. Tomes: A Manual of Dental Anatomy, P. Blakiston's Son and Co., 1914.
3. Hodge and McKay: The Microhardness of Teeth, The Journal of the American Dental Association, Feb., 1933.
4. Bennett: A Survey of the Conditions Associated with Immunity and Susceptibility to Dental Caries, The Journal of the British Dental Association, Feb. 15, 1939.
5. Prieswerk: Atlas and Text-Book of Dentistry, W. B. Saunders Co., 1906.
6. Hawk and Bergheim: Practical Physiological Chemistry, 11th edition, P. Blakiston's Son and Co. Inc., 1937.
7. Seifriz: Protoplasm, McGraw-Hill Book Company, Inc., 1936.
8. Hirschfeld: The Toothbrush - Its Use and Abuse, Dental Items of Interest Publishing Co., 1939.

Box, H. K.

HRA: 834

Periodontal studies. Nos. 7-9.

DATE.

21-28 Apr.

10-19 Nov.

NAME OF BORROWER.

H. K. Box

University of Toronto
Library

#7,8,9.

HRA 834

DO NOT
REMOVE
THE
CARD
FROM
THIS
POCKET

Acme Library Card Pocket
LOWE-MARTIN CO. LIMITED

